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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/543,247	04/05/2000	Shinji Takeda	7426-063	6907

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GRiffin & Szipl, PC
2300 Ninth Street South
Suite PH-1
Arlington, VA 22204-2320

EXAMINER

GRAYBILL, DAVID E

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 06/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/543,247	TAKEDA ET AL.
	Examiner	Art Unit
	David E Graybill	2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
 THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 11 March 2002.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 17-23,35,40,42-45 and 50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 17-23,35,40,42-45 and 50 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some *
 - c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>10-12</u> .	6) <input type="checkbox"/> Other: _____

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The information disclosure statement filed 11-01-01 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Specifically, copies of references P through W have not been provided. It has been placed in the application file, but the information referred to therein for references P through W has not been considered.

The 37 CFR 1.132 declaration by Genichi Matsumoto filed 03-11-02 is moot because Yusa is no longer relied on to reject the claims.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2)

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voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

In the rejections *infra*, reference labels are generally recited only for the first recitation of identical claim language.

Claims 17, 19, 20, 23, 35, 40, 42-45 and 50 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsura (6372080).

At column 3, lines 12-18 and 37-56; column 4, lines 1-11; column 9, lines 12-40; column 10, lines 41-53; column 12, line 1 to column 13, line 40; and column 14, line to column 15, line 7, Matsura teaches the following:

17. A material comprising an organic die-bonding film 1 having a water absorption of 1.5% by volume or less ["3 wt. % or less"], and the material includes a component that comprises an epoxy resin wherein the epoxy resin is any one of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin.

19. A material according to 17, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher ["1.2 kN/m"] when a semiconductor has been bonded to a support member using said material.

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20. A material according to 18, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

23. A material according to 22, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

35. A material according to 17, said component including a polyimide resin.

40. A material comprising an organic die-bonding film according to 17, further including an inorganic filler.

42. A method of bonding a semiconductor chip to a support member, the method comprising the steps of: providing a material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin wherein the epoxy resin is any of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin; and bonding a semiconductor chip 2 to a support member 3 using the material.

43. A method of bonding according to 42, wherein said bonding is carried out at a temperature of 100-350°C for a time period of 0.1 second - 20 seconds with a pressure of 0.1 - 20gf/mm².

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44. A method of bonding according to 43, wherein said bonding is carried out at a temperature of 150 - 250°C for a time period not longer than 2 seconds, with a pressure of 4 gf/mm² or less.

45. A method of bonding according to 44, wherein said bonding is carried out for a time period 1.5 seconds or less, with a pressure of 0.3 - 2 gf/mm².

50. A semiconductor device comprising: a semiconductor chip; a support member; and a material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin wherein the epoxy resin is any one of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin, wherein the material is provided between the semiconductor chip and the support member.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 17 and 40 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takigawa (5659003).

At column 1, lines 20-32 and 64-67; column 2, lines 11-16; column 4, lines 33-44; column 8, lines 3-8; column 9, lines 61-63; column 10, lines 1-6; column 25, lines 31-54; column 31, lines 37-42; column 49, line 1 to column 50, line 54; and column 65, line 13, Takigawa teaches the following:

17. A material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes a component that comprises an epoxy resin wherein the epoxy resin is any one of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin.

40. A material comprising an organic die-bonding film according to 17, further including an inorganic filler.

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To further clarify the teaching of a material comprising an organic die-bonding film, it is noted that, as cited, Takigawa teaches that the material comprises an organic, adhesive agent, coating material, protective film for electronic devices, particularly semiconductor chips. In any case, this statement of intended use does not result in a structural difference between the claimed composition and the composition of Takigawa. Further, because the composition of Takigawa is inherently capable of being used for the intended use the statement of intended use does not patentably distinguish the claimed composition from the composition of Takegawa. Claims directed to composition must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531 (CCPA 1959).

To further clarify the teaching of a water absorption of 1.5% by volume or less, it is noted that, as cited, Takigawa teaches that the water absorption is .1% by the method specified in JIS K-6911, which weight percent specified by the method is equivalent to 1.5% or less by volume.

Because Takigawa does not appear to teach verbatim a water absorption of 1.5% by volume or less, in the alternative, it is noted that Takigawa teaches that water absorption is a result-effective variable, and that minimal water absorption is

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desirable. Moreover, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed water absorption values because applicant has not disclosed that the values are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears *prima facie* that the composition would possess utility using another value. Indeed, it has been held that optimization of range limitations are *prima facie* obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See MPEP 2144.05(II): "Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. '[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'" In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969), Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056

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(Fed. Cir. 1990). As set forth in MPEP 2144.05(III), "Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. 'The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.' In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results."

Claims 18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takigawa (5659004).

Takigawa is applied for the same reason it was applied to claim 17, and is further applied infra.

Takigawa does not appear to explicitly teach the following:

18. A material according to 17, having a saturation moisture absorption of 1.0% by volume or less.
21. A material according to 20, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.
22. A material according to 17, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

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In any case, as cited, Takigawa teaches that moisture absorption and modulus of elasticity ["elastic modulus"] are result-effective variables. Moreover, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed saturation moisture absorption and modulus of elasticity values because applicant has not disclosed that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears *prima facie* that the composition would possess utility using another moisture absorption and modulus.

Claims 17, 19, 20, 23, 35, 40, 42-45 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita (5406124) and Takigawa (5659004).

At column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35; column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30 Morita teaches the following:

17. A material comprising an organic die-bonding film 4 having a water absorption of 1.5% by volume or less ["less than 1.2%"],

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and the material includes a component that comprises an epoxy resin.

22. A material according to 17, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C.

35. A material according to 17, said component including a polyimide resin.

40. A material comprising an organic die-bonding film according to 17, further including an inorganic filler.

42. A method of bonding a semiconductor chip to a support member, the method comprising the steps of: providing a material comprising an organic die-bonding film 4 having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin; and bonding a semiconductor chip 1 to a support member 6 using the material.

43. A method of bonding according to 42, wherein said bonding is carried out at a temperature of 100-350°C for a time period of 0.1 second - 20 seconds with a pressure of 0.1 - 20gf/mm².

44. A method of bonding according to 43, wherein said bonding is carried out a temperature of 150 - 250°C for a time period not longer than 2 seconds, with a pressure of 4 gf/mm² or less.

45. A method of bonding according to 44, wherein said bonding is carried out for a time period 1.5 seconds or less, with a pressure of 0.3 - 2 gf/mm².

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50. A semiconductor device comprising: a semiconductor chip; a support member; and a material comprising an organic die-bonding film having a water absorption of 1.5% by volume or less, and the material includes an epoxy resin, wherein the material is provided between the semiconductor chip and the support member.

To further clarify the teaching of a water absorption of 1.5% by volume or less, it is noted that although Morita does not explicitly teach that the water absorption is measured by volume, it is inherent that the absorption ranges are either equal or unequal. If the ranges are equal, of course, Morita anticipates the claimed invention. If the ranges are unequal, regardless of the particular units of measure, the range less than 1.2% overlaps, and again anticipates, the range 1.5% by volume or less between and including the lesser of the upper range limits 1.2% and 1.5% by volume and the shared (hence anticipated) lower limit zero.

However, Morita does not appear to explicitly teach wherein the epoxy resin is any of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin.

Nonetheless, as cited supra, Takigawa teaches wherein an epoxy resin is any of glycidyl ether, glycidylamine, glycidyl ester and an alicyclic epoxy resin. Moreover, it would have

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been obvious to combine the invention of Takigawa with the invention of Morita because it would provide an epoxy resin.

Also, although Morita teaches when a semiconductor has been bonded to a support member using the material, Morita does not appear to teach verbatim the following:

19. A material according to 17, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member using said material.

23. A material according to 22, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

Moreover, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member using said material because the conversion factor between the two peel strength units could not be readily determined. Still, as cited, Morita teaches that peel strength is a result-effective variable, and that an increase in peel strength is desirable. In addition, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular

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claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears *prima facie* that the invention would possess utility using another range.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita and Takigawa as applied to claim 17, and further in combination with Hozoji (JP5218107).

The combination of Morita and Takigawa does not appear to explicitly teach the following:

18. A material according to 17, having a saturation moisture absorption of 1.0% by volume or less.

Notwithstanding, in the English abstract and Table 1, Hozoji teaches this limitation. Furthermore, it would have been obvious to combine the invention of Hozoji with the invention of the applied prior art because it would facilitate adhesion.

Also, although Morita teaches when a semiconductor has been bonded to a support member using the material, Morita does not appear to teach verbatim the following:

20. A material according to 18, having a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member with said material.

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Moreover, it cannot be determined if the teaching of Morita of a 90 degree peel strength of $67\text{g}/10\text{mm}^2$ chip is equivalent to the instant disclosure of a 17 degree peel strength of $0.5 \text{ kgf}/5 \text{ mm} \times 5 \text{ mm}$ chip or higher when a semiconductor has been bonded to a support member using said material because the conversion factor between the two peel strength units could not be readily determined. Still, as cited, Morita teaches that peel strength is a result-effective variable, and that an increase in peel strength is desirable. In addition, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears *prima facie* that the invention would possess utility using another range.

Also, in the combination, Morita teaches the following:

21. A material according to 20, said material having a modulus of elasticity of 10 MPa or less at a temperature of 250°C .

Applicant's amendment and remarks filed 3-11-02 are addressed in the rejection *supra* and are further addressed *infra*.

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The 37 CFR 1.132 declaration by Masuko Takashi filed 3-11-02 is insufficient to overcome the rejection of claims based upon Morita as set forth in the last Office action because it does not refer to the individual claims of the application. Thus, there is no showing that the objective evidence of nonobviousness is commensurate in scope with the claims. See MPEP § 716.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

Applicant is required to acknowledge whether the teaching of Morita of a 90 degree peel strength of 67g/10mm² chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 kgf/5 mm x 5 mm chip or higher when a semiconductor has been bonded to a support member using said material. In addition, applicant is required to supply the conversion factor used to convert between the units.

Applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56.

Where applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This Office action has a requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the requirement for information. The time period for reply to the requirement coincides with the time period for reply to this Office action.

The prior art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated

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from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist whose telephone number is 703-308-1782.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/305-3431.



David E. Graybill
Primary Examiner
Art Unit 2827

D.G.
30-May-02